ON MOSCHITES VERRUCOSA (Verrill) AND ITS ALLIES.

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Striking instances of anomalous distribution of Cephalopoda are not frequently encountered during a perusal of the literature, especially among the less active, bottom-loving forms, most of which, so far as known, are prone to inhabit each its own definitely circumscribed district or faunal area. It therefore becomes of especial importance to subject such apparent exceptions as we do find to the most careful scrutiny, to ascertain whether they really exist, and then, if they seem so to do, to discover a reason. One of the most interesting and frequently quoted cases of this sort is that of Verrill's *Moschites* [=*Eledone*] *verrucosa*, originally described from 466–810 fathoms, off the coast of southern New England, again reported from considerably deeper water off Delaware Bay, and since recorded from 630 fathoms off the Kermadec Islands, and from 1,020 fathoms in the Gulf of Panama by Hoyle (1886, 1904).

So far as we know now, the Atlantic records for *verrucosa* are unimpeachable, and in any case they fail to offer such zoogeographic peculiarities that they need concern us here. That the case with the Pacific citations is altogether otherwise, it is the aim of the present paper to show.

The first of these is based upon a single male specimen taken by the Challenger Expedition in 1874, reported upon by Hoyle in 1886, and now preserved in the British Museum (Natural History) at South Kensington. Though Hoyle's remarks are brief (1886, p. 104), they show that he fully appreciated not only the specimen, but the peculiar interest which his identification gave to it. He wrote under "*Eledone verrucosa*" as follows:

"The agreement between the Challenger specimen and the admirable drawings and description of Professor Verrill is so close that there can be no doubt as to the correctness of this identification. The only differences appear to be that in the American specimens the cirri round and above the eyes are a little more prominent than in that from the Pacific, while the latter has the extremity of the hectocotylized arm formed like that of an *Octopus* rather than like that of an *Eledone*, as shown in Verrill's figure. The Challenger

specimen, moreover, has the second pair of arms the longest, the first come next, while the third and fourth are subequal and still a little shorter; but as appears from Verrill's measurements (*loc. cit.*), these proportions are liable to variation.

"The point of greatest interest in connection with this specimen is its capture so far away from the original habitat of the species, but this, as will appear in the sequel, is not without parallel (see p. 223)."

Believing that Hoyle's own notes, more particularly the observations on the hectocotylus, are a self-evident disproof of his identification, I recently (1916, p. 49) expressed my dissent from his conclusions and proposed the name *Moschites challengeri* for the Kermadec Island species. By way of more completely establishing the point in question I have obtained photographs both of the type specimen of *Eledone verrucosa* Verrill in the Museum of Comparative Zoology and of the "Challenger" specimen which is now the type of *M. challengeri*.[1] From these it would appear that while the general facies of the two species is indeed quite similar, the differences between them are none the less well marked. At the time the Challenger report was written, the great importance of the hectocotylus in classification was not so fully realized as at the present time, but reliance need not be had upon this alone. The curious stellate tubercles, which occur scattered over the dorsal surface of both forms, and which undoubtedly furnished the principal cause for their confusion, are in the case of *M. challengeri* much more numerous, more closely placed, and have a more general distribution over the body than in the Atlantic species. Where with *M. verrucosa* one counts but 13 or 14 of these tubercles in a line running transversely across the middle of the back, in the Kermadec species there are easily twice as many; and where in *verrucosa* the tubercles extend only slightly past the boundary between the head and umbrella (see Verrill's second figure), leaving most of the outer surface of the arms and umbrella smooth, in *M. challengeri* the tubercles extend down over the entire upper portion of the umbrella and even well out upon the basal portions of the arms. I think there is no doubt that a direct comparison of the specimens themselves would reveal other and doubtless more far-reaching differences, but those

[1] For the photographs of *Eledone verrucosa* I am indebted to Mr. Samuel Henshaw, of the Museum of Comparative Zoology; for those of *M. challengeri* to Mr. G. C. Robson, of the British Museum (Natural History), South Kensington.

enumerated above should be sufficient to prevent a further confusion of the species.

Miss A. L. Massy has suggested in correspondence that *M. challengeri* may be identical with the *M. charcoti* Joubin of the Antarctic, but in the absence of better evidence than that afforded by the literature I am unable to arrive at the same conclusion.[2]

The remaining Pacific record of *verrucosa* (Hoyle, 1904, p. 21) is admitted as doubtful by Hoyle because of the inadequate preservation of his material, so I am sure can on *a priori* grounds be rejected without hesitation. Quite possibly the specimens represent an undescribed species. In any case *M. verrucosa* must now be eliminated from our lists of the Pacific fauna.

Omitting from consideration the Antarctic members of the genus, several of which possess stellate tubercles somewhat resembling those of the species described, we arrive at the following summary of this group of *Moschites* as it has appeared in the literature to date:

1. **Moschites verrucosa** (Verrill, 1881). Pl. I.

1881. *Eledone verrucosa* Verrill, Bull. Mus. Comp. Zool., v. 8, p. 105, pls. 5, 6.
1881*a*. *Eledone verrucosa* Verrill, Trans. Conn. Acad. Sci., v. 5, p. 389, pls. 52, 53.
1882. *Eledone verrucosa* Verrill, Rep. U. S. Fish Com. 1879, pp. 393, 435 [183, 225], pl. 44, figs. 3, 3*a*.
1884. *Eledone verrucosa* Verrill, Trans. Conn. Acad. Sci., v. 6, p. 248.

466–1,255 fathoms, New England region (*Blake, Fish Hawk, Albatross*).

2. **Moschites challengeri** Berry, 1916. Pl. II.

1886. *Eledone verrucosa* Hoyle, Challenger Rep., p. 104 (*not* of Verrill, 1881).
1915. *Eledone verrucosa* Oliver, Trans. N. Z. Inst., v. 47, p. 559 (merely noted).
1916. *Moschites challengeri* Berry, Proc. Acad. Nat. Sci. Phila., v. 68, p. 49.

630 fathoms, off the Kermadec Islands (*Challenger*).

3. **Moschites** (species ?).

1904. *Moschites verrucosa* Hoyle, Bull. Mus. Comp. Zool., v. 43, p. 21 (not of Verrill, 1881).

1,020 fathoms, Gulf of Panama (*Albatross*).

The foregoing history well illustrates how much more apt to lead to erroneous theories of distribution and how much more difficult finally to rectify, is the improper union of species than, if we have

[2] As this paper is in final proof I am informed that Miss Massy has just published some further observations on this group in her report on the Cephalopoda of the "Terra Nova" Expedition, though the paper itself has been delayed in reaching me. It was in deference to this that consideration of the Antarctic forms was omitted from the present paper

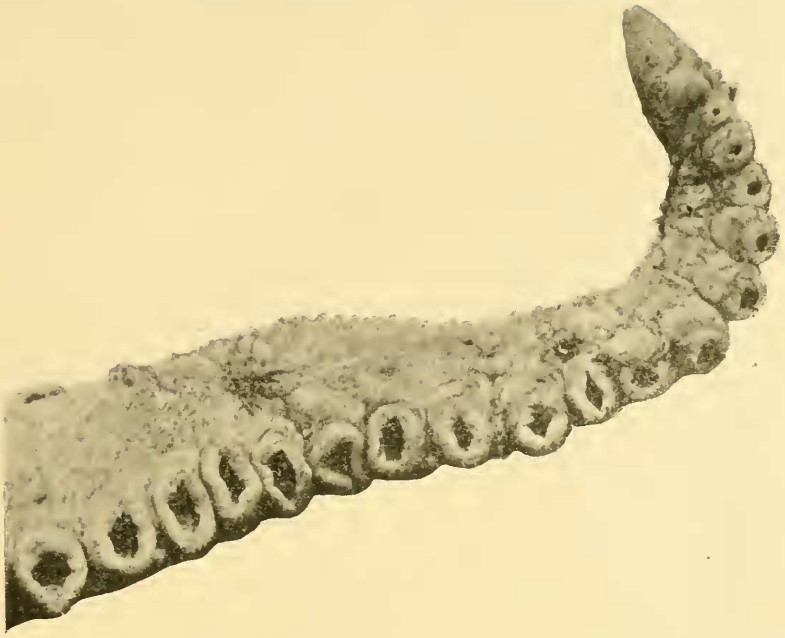

Fig. 1.—*Moschites verrucosa*. Distal portion of right third arm of type, showing hectocotylus, enlarged about four diameters.

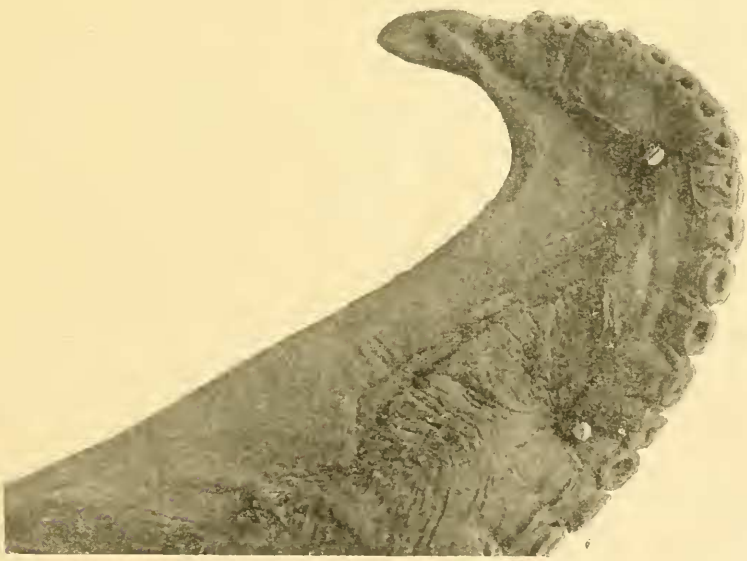

Fig. 2.—*Moschites challengeri*. Distal portion of right third of arm of type, showing hectocotylus; enlarged about two diameters.

but the two evils to choose from, their undue separation in the first place. With specimens from widely separated geographical areas, the presumption is that greater knowledge will generally increase rather than diminish the dependable differences.

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Explanation of Plates I and II.

Plate I.—*Moschites verrucosa* (Verrill). Dorsal view of type specimen, approximately natural size.

Plate II.—*Moschites challengeri* Berry. Dorsal view of type specimen, a little less than $\frac{2}{3}$ natural size.